Accordingly, it is recognized that the intermediate layer MIDL assumes a metastable state, and this state is fixed so as to exhibit a memory effect.

[0017] Then, when the pushing force is eliminated, the distance between the substrates returns to d1 (**FIG. 24C**). Here, the liquid crystal molecules in the vicinity of the vertical orientation films AL1, AL2 return to the original tilting state which is given by the electric field E. However, even when such a state is assumed, it can be seen that the liquid crystal molecules in the intermediate layer MIDL still maintain in a substantially horizontal state.

[0018] It has been found that this phenomenon occurs for the following reasons. That is, the only liquid crystal molecules, to which the orientation effect of liquid crystal molecules generated by the vertical orientation films AL1, AL2 extends, are the liquid crystal molecules which are brought into contact with the orientation films, and the arrangement of the liquid crystal molecules, other than these liquid crystal molecules, is determined on the basis of the electric field between the pixel electrode PX and the counter electrode CT and the intermolecular force between the liquid crystal molecules.

[0019] That is, the liquid crystal molecules that are disposed at positions other than the interfaces are caused to tilt in the horizontal direction or in the lateral direction by the electric field E and to return in the vertical direction or the longitudinal direction by the intermolecular force between the liquid crystal molecules. Accordingly, with respect to the liquid crystal molecules that are disposed at positions other than the interfaces, their degree of tilting is determined on the basis of the balance between the electric field E and the intermolecular force between the liquid crystal molecules.

[0020] In the case where the display panel is free from the above-mentioned pushing force, the liquid crystal molecules are tilted by the electric field as shown in **FIG. 23B**, and the neighboring liquid crystal molecules are tilted, while their long axis directions are substantially juxtaposed to each other. Accordingly, the intermolecular force assumes a state in which the intermolecular force strongly acts between the molecules in the longitudinal direction of the liquid crystal layer.

[0021] Accordingly, when the electric field is decreased, the liquid crystal molecules return to the tilting corresponding to the intensity of the electric field E after the whole electric field is reduced substantially uniformly. Then, by setting the electric field to a minimum level, the liquid crystal molecules in the vicinity of the vertical orientation films AL1, AL2 gradually return to the vertical state, due to the actions of the vertical orientation films AL1, AL2.

[0022] Here, due to the intermolecular force acting between the liquid crystal molecules, the liquid crystal molecules at positions other than the interfaces also gradually return to the vertical state corresponding to a return amount of the liquid crystal molecules at the interfaces and the liquid crystal molecules return to the vertical state as a whole.

[0023] To briefly recapitulate the above-mentioned considerations, when the pressing force is applied to a liquid crystal display panel, as shown in **FIG. 24B**, the intermediate layer MIDL is characterized by the fact that the long axis directions of the liquid crystal molecules are arranged substantially horizontally with respect to each other; and, even when the pressing force is eliminated, the intermediate layer MIDL forms a metastable state in which the intermolecular force acts between the liquid crystal molecules, and, hence, this state is maintained when the electric field is applied to some extent.

[0024] The liquid crystal molecules in the vicinity of the interfaces return to the normal orientation direction due to the actions of the vertical orientation films AL1, AL2.

[0025] Although the liquid crystal molecules at positions other than the interfaces of the orientation films also return to the original orientation direction correspondingly in a usual case, due to the formation of the intermediate layer MIDL, the intermolecular force to which the liquid crystal molecules at the interface side of the intermediate layer are subjected satisfies the relationship expressed by a following formula (1).

(intermolecular force received from liquid crystal molecules at interface of orientation film)<(intermolecular force received from whole liquid crystal molecules of intermediate layer)+(orientation force in horizontal direction of liquid crystals due to electric field) (1)

[0026] Here, all of the liquid crystal molecules of the intermediate layer MIDL assume a substantially horizontal state; and, hence, as a result, the liquid crystal molecules at the interface side of the intermediate layer MIDL also maintain a horizontal state.

[0027] In this manner, once the intermediate layer is formed, the term "the intermolecular force received from all of the liquid crystal molecules of the intermediate layer MIDL" is satisfied, and, hence, the intermediate layer MIDL is maintained in the metastable state for a long time. As a result, the liquid crystals exhibit a memory property and generate a state in which a picture can be drawn with the finger, resulting in a drawback as has been explained above.

[0028] Such a phenomenon has not been found in any one of the conventional TN type, STN type and lateral electric field type liquid crystal display panels. According to the analysis performed by inventors of the present invention, the reasons for this are as follows.

[0029] First of all, in the TN type or STN type liquid crystal display panel, the liquid crystal molecules include a large quantity of chiral material, which is a material which causes twisting of the liquid crystal layer. Accordingly, a mutual intermolecular force acting between the neighboring liquid crystal molecules is extremely strengthened. As a result, even when a state corresponding to the above-mentioned intermediate layer is generated, for example, the intermediate layer is dissipated due to the effect of a large quantity of chiral material.

[0030] Further, the liquid crystal molecules in the vicinity of the interfaces of the orientation films are in a horizontal state with a tilting angle of several degrees to ten and some degrees, and the liquid crystal molecules gradually assume the vertical state toward the intermediate portion of the liquid crystal layer when a voltage is applied.

[0031] Accordingly, even if the substrate is pushed, the liquid crystal molecules at the intermediate portion assume the lying direction, and, hence, the interaction between the liquid crystal molecules of the intermediate portion and the liquid crystal molecules in the vicinity of the interfaces of